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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,446	03/22/2001	Christopher A. Bode	2000.068000/TT4149	7640
23720	7590	09/24/2004	EXAMINER	
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			GARCIA OTERO, EDUARDO	
			ART UNIT	PAPER NUMBER
			2123	

DATE MAILED: 09/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/815,446

Applicant(s)

BODE ET AL.

Examiner

Eduardo Garcia-Otero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION: Non-Final (first action on the merits)

Introduction

1. Title is: METHOD AND APPARATUS FOR PERFORMING FIELD-TO-FIELD COMPENSATION.
2. First named inventor is: BODE.
3. Claims 1-25 have been submitted, examined, and rejected.
4. US non-provisional application was filed 3/22/2001, and no earlier priority is claimed.

Index of Prior Art

5. Conrad refers to US patent 6,528,219.
6. Su refers to US patent 6,456,736.

Definitions

7. “**Metrology**” is defined as “The science of measurement for determination of conformance to technical requirements including the development of standards and systems for absolute and relative measurements” by The Authoritative Dictionary of IEEE Standards and Terms, Seventh Edition, by IEEE Press, ISBN 0-7381-2601-2, 2000.

Claim Interpretations

8. In claim 1 limitation [1], the term “metrological data” is interpreted broadly as “**measured data**”. Note broad discussion at Specification bottom of page 8 and top of page 9 (“... and the like”).
9. In claim 1 limitation [3], “field” is interpreted as “**exposure field**” per Specification page 11 and FIG 2.
10. In claim 5 limitation [2], the term “calculating overlay errors for said exposure field based upon said overlay error” is interpreted as “...based upon said overlay error **data**”. This interpretation is made in view of claim 5 limitation [1] which states “acquiring overlay error data” and appears to be the proper antecedent basis. Please amend claim 5 appropriately.

35 USC § 102(e): filed after 11/29/00, or vol. pub. under 35 USD 122(b)

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action: A person shall be entitled to a patent unless – (e) the invention was described in- (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed

under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

12. **Claims 1-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Conrad.**
13. Independent claim 1 is a “method” claim with four limitations, numbered by the Examiner for clarity.
14. In claim 1 limitation [1], **“processing at least one semiconductor device”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
15. In claim 1 limitation [2], **“acquiring metrological data from said processed semiconductor device”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
16. In claim 1 limitation [3], **“performing a field-to-field metrology analysis based upon said metrology data”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the

alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.

17. In claim 1 limitation [4], **“performing residual-error analysis based upon said field-to-field analysis”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
18. In claim 2, **“processing said semiconductor device in a subsequent manufacturing process based upon said residual-error analysis”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
19. In claim 3, **“processing at least one semiconductor device further comprises processing semiconductor wafers”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
20. In claim 4, **“acquiring metrological data from said processed semiconductor device further comprises acquiring field-to-field metrological data analysis”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors

provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.

21. In claim 5 limitation [1], **“acquiring overlay error data from at least one exposure field on each processed wafer”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
22. In claim 5 limitation [2], **“calculating overlay errors for said exposure field based upon said overlay error”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
23. In claim 5 limitation [3], **“generating a set of field-mean error data”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.

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24. In claim 6, **“calculating overlay errors for said exposure field comprises calculating at least one misregistration error”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
25. In claim 7, **“calculating overlay errors for said exposure field comprises calculating at least one misalignment error”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
26. In claim 8 limitation [1], **“generating wafer-mean error data”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
27. In claim 8 limitation [2], **“comparing said wafer-mean error data to said field-mean error to calculate a difference between said wafer-mean error and said field-mean error data”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an

alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”.

28. In claim 8 limitation [3], **“determining whether a significant residual error exists based upon said comparison of said wafer-mean error and said field-mean error data”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
29. In claim 8 limitation [4], **“using said wafer-mean error to perform manufacturing adjustments in response to a determination that significant residual error does not exist”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
30. In claim 9 limitation [1], **“adjustment in response to a determination that significant residual error exists”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.

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31. In claim 9 limitation [2], **“performing at least one wafer-level adjustment to compensate for at least one field level error”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
32. In claim 10 limitation [1], **“calculating at least one field compensation parameter for at least one field-level adjustment in response to a determination that significant residual error exists”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
33. In claim 10 limitation [2], **“performing at least one field-level adjustment to compensate for at least one field-level error”** is disclosed by Conrad Abstract “photolithograph tools have alignment systems... wafer... residual errors provide a metric by which to evaluate alignment system-alignment mark combinations ... overlay”, and column 3 line 54 “Within-field data variation is separated from field-to-field variation and residual errors are then determined... How well an alignment system is working is demonstrated by the extent the alignment target location can be expressed as within-field variation plus a field-to-field variation”, and FIG 8 “overlay” and “systematic error parameters”, and FIG 3 “alignment”.
34. Claims 11-25 are “system”, “apparatus”, and “computer readable program storage device” claims, and are rejected for the same reasons as “method” claims 1-10 above.

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Additional Cited Prior Art

35. The following US patents or publications are hereby cited as prior art, but have not been used for rejection. Applicant should review these carefully before responding to this office action.
36. US patent 6,456,736 discloses "field-to-field critical dimension (CD) variations using statistical techniques" at Abstract.

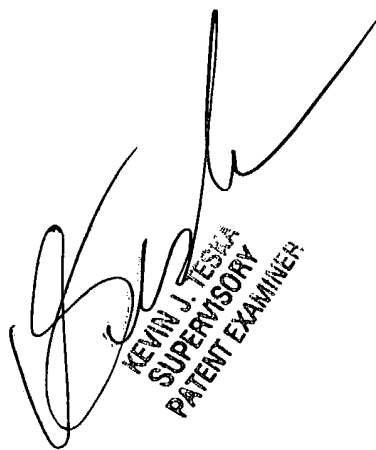
Conclusion

37. All pending claims stand rejected.

Communication

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * * *



KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER